【DESCRIPTION】

【Invention Title】

FRAMEWORK SYSTEM FOR TRUSS DECK USING CONSTRUCTION MOLD ASSEMBLY

【Technical Field】

The present invention relates to a truss framework system for slabs constructed of iron-bar framework having an improved construction property and construction molds, in particular, to a truss framework system, which greatly improves convenience and safety of the construction by using a mold assembly constructed by engaging securing devices including slide plates with maintaining predetermined intervals, the sliding plate being slidably engaged with mold panels and wedge-shaped, to solve problems caused by the conventional iron-bar framework and occurring in the binding work of the mold panels and the iron-bars arranging work, to thereby increase efficiency of the construction by abridging an iron-bar arranging process to some extent, which is executed by the workers for binding the iron-bars to each other with maintaining the intervals there-between equally in the construction field to conform to the thickness of the structure to be constructed thereby to form the framework. The present truss framework system can greatly accomplish the reduction of the construction period and the reduction for the labor and construction costs by constructing a structure in such a manner that the framework system is fabricated to conform to the size and shape of the respective divided area of the slabs, after dividing the slabs of one floor or a house into more than two pieces, in constructing slabs of a structure, in particular, a building, using the improved truss framework, and then the framework system for the slab is located above the constructed cross-beams and/or wall bodies by using a tower crane and the like.

【Background Art】

The Korea patent registration No.0345526(2002. 07. 10) entitled with An iron-bar truss using an expanded metal, the Korea utility model registration No. 0215040 (2000. 12. 15) entitled with a deck panel for an iron-bar concrete slab , the Korea utility model registration No. 0211044 (2001. 05.08) entitled with A suspension preventing apparatus for a deck panel in an iron-bar concrete slab , and the Korea utility model registration No. 0214547 (2001. 06. 05) entitled with A deck panel for an iron-bar concrete slab?are all pertained to the same owner of the right (Chan-jin, Jeon), and

relate to the structure of the iron-bar concrete for constructing the slabs. FIG. 1a shows a structure of the iron-bar concrete shown in FIG. 1 of the Korea patent registration No. 0345526. As shown in FIG. 1a, the iron-bar truss of the above patent comprises an expanded metal 4 secured to a bottom plate 2 in the longitudinal direction, and upper and lower iron-bars 6, 8 for reinforcing the expanded metal 4.

Although not described and shown obviously in the drawings and specifications, according to the description and contents of the above patent and utility model, the bottom panel 2 has been surely fabricated of iron material. However, in such case, the bottom plate 2, which is made of the iron material and not the concrete, is exposed at the lower of the constructed slabs contrary to the conventional building, to thereby give limitations at the time of mounting ducts for wiring, ventilation, water supply system, or sewerage system, and the like, resulting in the problem of impossible to use in general.

Also, the bottom plate 2 made of the iron material becomes to increase the construction cost, which is very unreasonable in consideration of the tendency for use of the mold panel recycled in connection with the recent recycling of the resources and prevention of the environmental contamination.

At the same time, because the iron-bar trusses described above should be transported by transporting means such as a trailer, and the like, after they have been fabricated in the factory, the transporting cost should be increased to some extent. Also, as the size of the iron-bar truss transported is limited, it becomes difficult to engage the bottom plate with another bottom plate in the construction field by means of welding, and the like, so that it cannot improve the construction efficiency in the large scale construction process, which is the object of introducing the framework system using the truss structure. Such problems are entirely common to the above registered patent and utility model.

Further, the Korea utility model registration No. 0369373(2004. 12.'24) allowed to Yeon-jin, Kim, and the like, and entitled with a construction system for a concrete structure having semi-circular pins in cross-section , and the Korea utility model registration No. 0373487 (2005. 01. 07) allowed to the same persons, and entitled with a mold engaging structure having binding means formed with a notch portion , have been suggested to increase the convenience of construction and the binding force between the iron-bar

framework and the mold, and to accomplish the easy removal of the projected iron-bar after the injection of the concrete, in case of arranging the prefabricated iron-bar framework developed to improve the work of making the iron-bar framework by arranging the main iron-bars by predetermined intervals one by one and binding to each other so that the iron-bars arranged in the mold correspond to the thickness of the construction structure, in particular, to the wall body thereof.

The above utility models are basically differed from the truss framework system of the present invention in that they are truss framework systems for the wall body of the building, however, it would be possible to change the framework systems of the above utility models so as to use in the construction of the slabs.

FIG. 1b shows a truss framework system shown in FIG. 1 of the utility model registration No. 0369373. Although FIG. 1b shows what is described as a prior art in the utility model registration No. 0369373, the framework systems shown in utility model registration No, 0369373 and the utility model registration No. 0373487 are substantially identical to the truss framework system shown in FIG. 1b in a broad sense.

The truss framework system of the above utility model uses the iron-bar frameworks produced as prefabricated products in the iron-bar factory, and the like, and which are not produced in the construction field. Such framework 33 comprises two pieces of main iron-bars 31 maintaining the intervals corresponding to the thickness of the wall body, and a lattice iron-bar 30 for maintaining the interval and reinforcing the main iron-bars 31.

The framework 33 is constructed in the construction field such that bent projections of the lattice iron-bar 30 folded in a zigzag shape are inserted into rectangular slits 11, 21 of the mold panels 10, 20 and fixed, and the mold panels and the framework 33 are fixed into holes formed between the panels 10, 20 and the bent projections by crossing the iron-bars 34. The main iron-bar 31 of the framework is engaged with a traverse iron-bar 32 and reinforced in the mold by means of using a wire or welding.

The bent projections in the lattice iron-bar 30 of the two registered utility models function to prevent the main iron-bars from being exposed from the injected wall body, by making the mold panels 10, 20 and the framework 33 be spaced apart by predetermined intervals.

Such construction of the two registered utility models is to solve the inconvenience of interposing supports between the conventional mold panels and the main iron-bars of the framework for maintaining the interval one by one, and the bent projections of the lattice iron-bars 30, which are exposed to the outside at the time of dissembling the mold after the injection of the concrete, are to be cut and removed.

However, with regard to such two utility models, because the mold panels 10, 20 should be formed with slits, especially, rectangular slits 11, 21 for the projections of the lattice iron-bars 30 one by one, it becomes to delay the construction work when the mold panel is formed with slits one by one in the construction field.

Also, in case of using a panel formed with slits, which have been fabricated in the factory as pre-fabricated products, it would be required to form new slits in the mold according to the change of the working circumstances, resulting in the inconveniences of the working.

In addition, as shown in the above publication gazettes, it is described that the concrete structure of the two registered utility models is transported to the construction field after it has been assembled in the factory and not in the construction field.

This is because the assembly of the concrete structure in the construction field is very difficult, as it requires substantial degree of strain, precision, skillfulness, and consumption of large muscular power, wherein the assembly of the concrete structure is executed by inserting the binding iron-bars 34 one by one with projecting the bent projections of the lattice iron-bars 30 of the respective framework 33 to the slits 11, 21 of the mold panels 10, 20 so as to securely engage the framework 33 with the mold panels 10, 20 without some intervals there-between.

Further, because it requires large costs to fabricate and transport the concrete structure having desired size and shape for the constructed structure, especially, the constructed structure such as collective building from the outside, which is not close to the construction field, and it requires to divide the structure for the desired constructed structure into proper pieces to transport, it becomes difficult to accomplish the simplicity and safety of the iron-bar arranging work, and the reduction of cost, which is the object and effects of the utility model. Accordingly, they should be assembled in the factory close to the construction field due

to such reasons. However, the closeness of the factory cannot be assured according to the conditions of the factory.

At the same time, as the two registered utility models allowed to Yeon-jin, Kim, and the like use the mold panel conventionally made of a plywood board material, there occurs no problem caused from the bottom plate made of an iron material as have been brought about in Korea patent registration No. 0345526, and the like. However, there can be occurred a problem that the panel with rectangular slits can be easily torn with centering the rectangular slits, in case of using it as the slabs, when a load surpassing the predetermined level is applied due to the weight of the panel.

Therefore, in order to prevent the damage of the mold panel, the construction process using the structures of the two registered utility models requires less numbers of long wire members supporting the mold panel, especially, the mold panel for the slabs, yoke members for supporting the wire member in a fashion crossing with the long wire member, and support members for supporting the yoke member than those of the conventional construction. However, there is also remained a problem that it still requires the use of the supporting members, and the like.

Further, with regard to the related prior art, there existed Korea utility model registration No. 0360307 (2004. 08. 18) allowed to Index engineering, and entitled with An iron-bar assembly type slab deck using the fly-wood, and the Korea utility model registration No. 0372661 (2005. 01. 03) allowed to Moo-yong, Park, and entitled with a mold separate type truss deck.

Especially, as shown in FIG. 1c, the truss deck disclosed in Korea utility model registration No. 0372661 allowed to Moo-yong, Park is constructed that an iron-bar framework made by engaging upper iron-bars 13 and lower iron-bars 14 by lattice iron-bars 12 in zigzag fashion, and panels 11 made of a fly-wood material, or an FRP plate have been engaged with each other by supporting means 20.

In this regard, the supporting means 20 have been constructed that a securing support 21 having a length corresponding to that of a panel 11 is located below the panel 11, and a bolt 22a for the engaging support connected to the lower iron-bar 14 and passing through a hole formed at the panel 11 are engaged with each other via a washer 22b to thereby engage the lower iron-bar 14 with the panel 11 securely.

In the drawing, reference numeral 21 represents for a notch portion for

removing the bolt 22a after curing the concrete.
However, the truss framework system disclosed in the above utility model registration No. 0372661 has a problem that the progress of engaging the framework with the panel is not executed smoothly because every bolt should be engaged by rotating nuts one by one. Also, it is not convenient because every nut should be rotated and released to separate the panel after curing the concrete of the slab deck. In this regard, the above utility model registration No. 0372661 has not suggested a solution for such problems.

【Disclosure】

【Technical Problem】

Therefore, the present invention has been made to solve the problems occurring in the conventional arts relating to the truss framework system, such as the Korea patent registration No. 0345526 allowed to Chan-jin, Jeon, the Korea utility model registration No. 0369373 allowed to Yeon-jin, Kim, and the like, the Korea utility model registration No. 0360307 allowed to Index engineering, and the Korea utility model registration No. 0372661.
Such problems can be summarized as follows.
It was still inconvenient to arrange and engage the mold panels in the assembly of the framework and the mold panel.
Also, the transporting cost was increased because the framework and the mold panel should be assembled in the factory and transported to the construction field.
Further, it was required to assemble again the truss framework system in such a size enough to suspend it between the girders of the building or between the wall bodies to make use of an actual truss construction method, because the size of the framework system should be reduced requisitely so that it could be transported.
Also, there was a problem that the bottom plate made of the iron material or the mold panel made of the timber should be formed with rectangular slits.
In addition, there was a problem that the construction of the framework could not be executed in connection with the finishing work of plaster boards or mounting of the ducts for the wiring, ventilation, water supply and sewerage system, and the like, after the dismantling of the mold following the injection of the concrete.
Last, there was a problem that the engagement, securing, and dismantling of the iron-bar framework from the mold panels made of materials such as a ply-

wood and FRP plate could not be executed smoothly and quickly.

Accordingly, the present invention has been made to solve problems occurring in Korea utility model registration No. 0372661, and the primary object of the present invention is to provide a truss framework system incorporating a mold assembly, in which wedge-shaped securing devices have been arranged with predetermined intervals at the lower portion of a mold panel to increase the efficiency of the engaging work of the framework with the mold panel, in case of using the prefabricated framework.

Another object of the present invention is to provide a truss framework system, which can be assembled in the construction field by providing the prefabricated framework, prefabricated connecting means, prefabricated means for maintaining the intervals, prefabricated mold assembly, and prefabricated devices for connecting the panels, and can reduce the labors and costs for transporting the truss framework system, and for constructing the assembly factory near every construction field.

Still another object of the present invention is to provide a truss framework system, which is easy to arrange the prefabricated framework by providing members for connecting the special type framework to the panels and for maintaining the intervals there-between, and is good in adaptation to the construction field as well as causing no possibility of damages to the panels because it has been sufficient to form round holes at the mold panels, differing from the utility model registration No. 0369373 and utility model registration No. 0373487, in which rectangular slits have been formed at the mold panels.

Still another object of the present invention is to provide a construction method for slabs using a truss construction method, in which a truss framework system is fabricated to conform to the size and shape of the respective divided area of the slabs, after dividing the slabs of one floor or a house into more than two pieces, in constructing slabs of a structure, in particular, a building, using an improved truss framework, and then the framework system for the slab is suspended above the constructed cross-beams or wall bodies by using a tower crane and the like, so that it is possible to accomplish the striking reduction of the construction period, reduction of the costs for labors and materials, prevention of the safety accidents, maintenance of the high quality of the structure, minimization of the wastes, and advantage of low noise.

【Technical Solution】

To solve such objects of the present invention, there is provided a truss framework system for slabs using the mold assembly of the present invention comprising a framework of a two or three dimensional shape, comprised of at least two lower and upper main iron-bars maintaining the interval therebetween corresponding to a thickness of the slab to be constructed, and lattice iron-bars for maintaining the interval and reinforcing the main iron-bars; a mold assembly including a panel formed with a plurality of insert holes spaced with predetermined interval and positioned below the framework, a wedge portion formed with a slit having an extension portion adjoining the lowest point and a narrow portion extending from the lowest point to the highest point and communicating with the extension portion, and arranged at the respective position of the insert holes of the panel, a sliding plate having a contacting portion formed with the wedge portion, and sliding means for slidably attaching the sliding plate to the panel; and connecting means for connecting the framework and the panel, and including an engaging portion connected to the framework, and an exposure portion having an extension portion connected to the engaging portion and is constructed that the upward and downward movement thereof is restricted by the engagement with the narrow portion of the slit caused by the movement of the sliding plate after extending to the extension portion of the slit of the sliding plate via the insert hole of the panel of the mold assembly.

【Advantageous Effects】

Accordingly, according to the truss framework system of the present invention, construction capability can be improved by introducing connecting means for connecting the framework made in the factory and the mold panel, and for maintaining the predetermined interval between them. Especially, the process of fabricating the framework system can be strikingly reduced and the rigidity of the truss framework system can be improved by constructing the mold assembly using the panels with which the wedge-shaped securing device has been engaged.

Also, according to the construction method for the slabs of the present invention, a truss framework system is fabricated to conform to the size and shape of the respective divided area of the slabs, after dividing the slabs of one floor or a house into more than two pieces, in constructing slabs of structures, in particular, buildings which have multi-floors and are

constructed in mass to form a complex, using an improved truss framework, and then the framework system for the slab is suspended above the constructed cross-beams or wall bodies by using a tower crane and the like, so that it is possible to accomplish the striking reduction of the construction period because it is not necessary to execute the iron-bar arranging work one by one or to mount the supports, and to reduce costs for labors and materials. Further, it is possible to prevent the safety accidents from being occurred in the works of removing the projected iron-bars following the iron-bar arranging work or curing of the slabs, and works of mounting the supports and dismantling of them. Also, it is possible to maintain the high quality of the structure in spite of the passing of time due to the truss structure between the framework and the wall body, and because the securely connected truss framework system has been used to increase the equality of the strength in the slabs, to minimize the wastes because the requiring materials are small, and to obtain the advantage of reducing the noise in mounting the framework for the slabs and dismantling of the mold.

【Description of Drawings】

FIG. 1a is a perspective view of an iron-bar truss shown in FIG. 1 of Korea patent registration No. 0345526;

FIG. 1b is a cross-sectional view of a truss framework system shown in FIG. 1 of Korea utility model registration No. 0369373;

FIG. 1c is a front view of a truss framework system shown in FIG. 3a of Korea utility model registration No. 0372661;

FIGs. 2a and 2b are exploded perspective view and cross-sectional view of a truss framework system according to the present invention;

FIGs. 3a and 3b are exploded perspective view and cross-sectional view of a truss framework system having another type of connecting means differing from that shown in FIG. 2a;

FIG. 4a is a perspective view of a mold assembly, in which a securing device for connecting means and connecting device for panel are attached to a panel as prefabricated products;

FIG. 4b is a perspective view of a slide plate having sliding means differing from that shown in FIG. 4a;

FIG. 4c is an exploded perspective view of the connecting device for the panel shown in FIG. 4a;

FIG. 4d is a perspective view showing an engaging process of the sliding plate of the securing device and an exposure portion of the connecting means from the bottom side;

FIGs. 5a through 5d and FIGs. 6a and 6b are perspective views, each of which showing a member constructed by incorporating different type of connecting means and interval maintaining means;

FIG. 7 is a schematic view showing a process of constructing the slabs using the truss framework system according to the present invention;

FIG. 8 is a cross-sectional view showing a state of showing the truss framework system according to the present invention mounted to girder portions; and

FIG. 9 is an exploded perspective view showing a state of engaging a hanger-pole with a nut bushing after removing the exposure portion following the curing of the slab concrete.

【Mode for Invention】

Hereinafter, the present invention will be explained in detail with reference to the appended drawings below.

For your reference, the numerals represented in the conventional framework system shown in FIGs. 1a to 1c and the numerals for respective constituting elements of the framework system of the present invention are designating different members. Further, in the drawings following FIG. 2a, the reference numerals having the same Arabic number in the first and second positions, or and the reference numerals having the same Arabic number or alphabet in the second or first position designate the same member with the same function. Therefore, the relations between the reference numeral and the constituting elements can be understood in view of such standard, if there is no special explanation about it.

As shown in FIGs. 2a and 2b, the truss framework system F of the present invention substantially comprises a framework 10, a mold assembly M (refer to FIG. 4a) including panels 20 arranged below the framework 10, and connecting means for inter-connecting the framework 10 and the mold assembly M.

The truss framework system F of the present invention further comprises an interval maintaining means for separating the lower main iron-bar 11B of the framework 10 from the mold panel 20 to a proper interval. If the framework 10 is fabricated as pre-fabricated products in the factory, it comprises two

main iron-bars 11A, 11B separated by predetermined interval from each other, and a lattice iron-bar 13 for maintaining the interval between the man iron-bars and reinforcing them. While the lattice iron-bars 13 are arranged with predetermined interval there-between so as to cross the two main iron-bars 11A, 11B vertically. However, as shown in FIG. 3a, it can be constructed to be bent in a zigzag type and is engaged with the two main iron-bars 11A, 11B at the bent portion to constitute a lattice iron-bar 113.

The framework 10 can be fabricated in a two dimensional shape, in which more than two iron-bars are arranged in an identical artificial plane, or it can be fabricated in a three dimensional shape, in which more than three main iron-bars are arranged in different planes. In this instance, the distance between the main iron-bars should correspond to the thickness of the slabs to be constructed. In this regard, the distance between the outermost main iron-bars is limited to be narrower than the thickness of the slab, so that the main iron-bars can not expose to the outside of the concrete from the slab.

The framework 10 fabricated in the factory is transported to the construction field and is arranged into a desired shape of slab to engage with the mold panel 20. In this regard, the main iron-bars 11A, 11B of the different frameworks 10 arranged above the mold panels 20 by predetermined interval can be engaged with a traverse reinforcement iron-bar 15 by means of binding wires (not shown) or welding, and so on.

As shown in FIG. 4a, the mold assembly M of the truss framework F of the present invention comprises a mold panel 20 having insert holes 21 formed regularly with predetermined interval, and securing devices 30 including wedge-shaped slide plates 30A arranged at every position corresponding to the insert holes 21 of the panel 20 so that they can slide by sliding means.

The panel 20 is made of a plywood board material or a synthetic resin material such as an FRP, and is used to remove after the curing of the concrete in the slab. In this regard, a well-known coating agent can be applied on the panel 20 to facilitate the separation from the concrete.

The securing device 30 attached below the panel 20 is arranged for every position of the insert hole 21 of the panel 20, and comprises sliding means, and a sliding plate 30A attached to the panel so that it can move slidably by the sliding means.

As shown in FIG. 4a, the sliding plate 30A is formed with a slit 33A

comprising an extension portion 33a near the lowest point, and a narrow portion 33b extending from the lowest point to the highest point and communicating with the extension portion 33a, and comprises a projecting wedge portion 33, and a plate shaped contacting portion 31 having the wedge portion 33.

Further, the sliding means is constructed that the sliding plate 30A can move slidably at the lower of the mold panel 20, so that the insert hole 21 of the mold panel 20 and the slit 33A of the sliding plate 30A can be arranged in an identical axis when the sliding plate 30A is secured below the mold panel 20.

As shown in FIG. 4a, the sliding means comprises recesses 31a, 31b formed at both sides of the contacting portion 31 of the sliding plate 30A, and a securing plate 30B formed with projecting engaging fragments 39a, 39b for biting the recesses from outside.

The securing plate 30B shown in FIG. 4a is formed at a position corresponding to the insert hole 21 of the panel 20, and comprises an insert hole 35 for inserting an extension portion 45A of a connecting means 40 as shown in FIGs. 2a and 4d, and securing holes 37 formed at four corners thereof for inserting engaging means such as pins 37a so that it can be secured to the panel 20.

It is preferable that the distance between the inside surfaces of the engaging fragments 39a, 39b of the securing plate 30B is some longer than that of the outside surfaces of the recesses 31a, 31b of the sliding plate 30A for ensuring the smooth slide movement of the sliding plate.

Also, as shown in FIG 4b, the sliding means according to another embodiment of the present invention comprises sliding elongated holes 130a, 130b formed at both sides of the sliding plate 30A, and engaging member such as nails P for engaging with the panel 20 after passing through the elongated holes.

The reference numerals of the elements constituting the sliding plate 130A shown in FIG. 4b are identical with those of the elements constituting the sliding plate 30A shown in FIG.4a, because they perform the same functions. Accordingly, it is required to understand the functions in view of the descriptions of the sliding plate 30A shown in FIG. 4a, and explanation about them is omitted for clarity.

In addition, both ends of the sliding plates 30A, 130A shown in FIGs. 4a and 4b are formed with ascending portions 31c, 31d, 131c, 131d bent by

predetermined angle. They can be struck lightly so as to engage or release the sliding plates 30A, 130A with the exposure portion 45 of the connecting means 40.

Further, as shown in FIG.4a and 4c, it is preferable that the truss framework system of the present invention comprises a connecting device 50 for connecting the panels. The connecting device 50 includes an engaging member 51 having an engaging bracket 51A comprising a contacting portion 51a formed to bend so that it can define the plane identical with the side of the panel 20, and engaged at the corners of the panel with predetermined interval, and a separation preventing portion 51b bent inwardly from the contacting portion 51a. The engaging member 51 is formed with a plurality of engaging holes 53 at the main body for engaging with the panel 20 so that it can be secured to the panel by means of the engaging members 53.

Also, the connecting device 50 includes a binding member 55 for binding two engaging members 51 secured to the two adjacent panels 20.

The binding member 55 is formed with a binding elongated opening 55A comprising an extension portion 55a having a size enough to receive the separation preventing portion 51b of the engaging bracket 51A of the two engaging members 51, and a narrow portion 55b for close contacting the respective contacting portion 51a with the member by binding the two engaging members 51 with maintaining the engagement of the engaging bracket 51A with the binding member. The binding member s formed with a bent stop portion 55B at the upper portion.

According to the securing device 30 shown in FIGs. 4a through 4c, the engaging and dismantling works of the iron-bar framework and the mold panel can be more convenient in comparison with those in the conventional truss framework system shown in utility model registration No.0372661, and the like.

In the truss framework system F of the present invention, the connecting means for connecting the framework 10 and the mold assembly M can be embodied in a various shapes.

Further, it is desirable that the lower main iron-bar 11B of the framework 10 and the panel 20 should not be exposed to the outside because they are separated from each other by predetermined interval by means of the interval maintaining means when the mold panel has been removed after the curing of the concrete in the slab, so that the main iron-bars 11B constituting the

framework 10 can be prevented from being abraded.
As shown in FIG. 1c, such interval maintaining means may be a projection formed by extending a lower bent portion of the lattice iron-bar 12, which is arranged continuously in a zigzag manner, below the lower iron-bar 14.
As will be explained below, it is suggested that the connecting means and the interval maintaining means are integrated into one composite member in the present invention. In the explanation of such complex members, the connecting means denotes it in the specification for convenience.
With regard to such connecting means, the composite connecting means 40, 140, 240, 340, and 440 shown in FIGs.5a through 5d can be classified in a same group, and comprises a framework, especially, an engaging portion for engaging with the main iron-bar, an exposure portion inserted into the insert hole 21 of the panel 20 and exposed to the lower portion of the panel, a connecting portion connecting the engaging portion and the exposure portion, and a plate type, especially a dome type, disk -shaped supporting member (the supporting member shown in FIG. 5c is a cone shape) acting as interval maintaining means, and connects the framework 10 and the panel 20 is such a fashion as shown in FIGs.2a and 2b.
In FIGs. 5a through 5d, the reference numerals of identical ten digits and one digit designate members having identical functions, if there is no special explanation about them, it is only required to understand the interrelation between the reference numerals and constituting elements in view of such standard. In particular, in FIG. 5d, reference numerals have been omitted in order to avoid repetition of explanation.
As shown in FIG. 5a, the connecting means 40 is connected to the upper main iron-bar 11A of the framework 10 via a upper engaging portion 41A of the engaging portion, and is connected to the lower main iron-bar 11B via a lower engaging portion 41B of the engaging portion 41. In this regard, the main iron-bars 11A, 11B and the engaging portions 41A, 41B are desirable to be welded.
Further, the engaging portion 41, the connecting portion 44 and the exposure portion 45 of the connecting means 40 are all made by bending and transforming a rod steel, however, the connecting means can be transported variously by those peoples in the related art.
Then, as shown in FIGs. 2a and 2b, the connecting means 40 further comprises a supporting member 43 arranged at the lower of the portion 41B engaging

with the connection portion 44 and contacting with the upper portion of the mold panel 20, the supporting member 43 being shaped as a plate member, especially, a disk member having a dome portion, and a stopping projection 44A for restricting the upward movement of the supporting member 43.

The stopping projection 44A is constructed to press and transform the connection portion 44 so that it becomes to be plain, and it can act as a basic point of separation to the framework system F, when the exposure portion 45 is removed, which is projected from the outside surface of the concrete structure cured at the time of dismantling the mold panel 20 following the curing of the concrete. In other words, the stopping projection 44A itself can act as a notch.

In addition, the supporting member 43 having a dome portion can define a space portion R into which no mortar is supplied, as shown in the enlarged circle of FIG. 2b, so that the mortar cannot be spouted through the insert hole 21 of the mold panel 20 to the outside. Such effect of preventing the spout of the mortar is more excellent than that of the case when the supporting member 43 is arranged upside down in opposite to the drawing.

As no mortar is flowed into the supporting member 43 having a dome portion, it is possible to remove the supporting member 43 together with the removal of the exposure portion 45 of the connecting means 40 at the time of removing the mold following the curing of the concrete, so that it becomes excellent in the reduction of the costs for the materials when the separated supporting member is to be recycled.

Also, the exposure portion 45 is positioned below the panel 20 after passing through the insert hole 21 of them mold panel 20, and is formed with an extension portion, preferably a polygonal extension portion, more preferably a hexagonal extension portion 45A, which is increased in cross-section, to engage with he sliding plate 30A of the securing device 30 constituting the framework F previously explained in connection with FIG. 4a to thereby enable the engagement of the supporting member 43 of the connecting means 40 with the mold panel 20. Further, it is possible to easily remove the exposure portion 45 by gripping the extension portion 45A having a hexagonal section with tools such as a wrench, and the like and rotating it, at the time of cutting and removing the exposure portion 45 exposed to the outside of the outer surface of the cured concrete structure on the basis of the stopping projection 44A, when the mold panel 20 is dismantled after the

curing of the concrete in the framework system F.
Although the outer diameter of the extension portion 45A can be bigger or smaller than the inner diameter of the insert hole 21 of the panel 20, it should be smaller than the inner diameter of the insert hole 21, the inner diameter of the insert hole 35 of the securing plate 30B, and the inner diameter of the extension portion 33a of the slit 33A formed at the sliding plate 30A, and should be bigger than the clearance width of the narrow portion 33b of the slit 33A in the sliding plate 30A, in consideration of the securing device 30 engaged with the panel 20 of the mold assembly M.
Such extension portion 45A of the exposure portion 45 is common to the connecting means 40, 140, 240, 340, 440, 540, and 640 for connecting the panel 20 shown in FIGs. 5a through 5d, and FIGs. 6a and 6b, and the framework 10. It is requisite for the function of the sliding plate 30A of the securing device 30 constituting the mold assembly M, which is one of the main technical elements of the present invention.
In other words, the exposure portions 45, 145, 245, 545, 645 extending through the extension portion 33a of the slit 33A in the sliding plate 30A to be exposed below the panel 20 after it passes through the insert hole 21 of the panel 20 and the insert hole 35 of the securing plate 30B, which is the sliding means, is caught by the narrow portion 33b of the slit 33A by the movement of the wedge-shaped securing device 30 as shown in FIG. 4a, and upward and downward movement of the sliding plate 30A, especially, the mold assembly M is restricted by the extension portions 45A, 145A, 245A, 545A, and 645A.
In addition, as can be seen in FIGs. 2a and 2b, or in FIG. 5d showing similar connecting means 340, 440, an artificial straight line connecting the portion 44 of the shown connecting means 40 with the exposure portion 45d, and another artificial straight line connecting respective center of the two main iron-bars 11A, 11B of the framework 10 positioned at the two engaging portions 41A, 41B are arranged to overlap, so that it is possible to easily maintain the center of the framework 10 to thereby arrange the framework and the panel uniformly in a vertical relation and to increase the convenience of assembly work at the time of engaging the iron-bar framework 10 with the mold panel 20.
The advantages obtained from the arranging structure of the connecting means are the same in connecting means shown in FIGs.5b through 5d.

Then, the connecting means shown in FIG. 5b is different from the connecting means shown in FIG. 5a in that the engaging portion 141 connected to the lower main iron-bar 11B of the framework 10 is constructed to be a hook portion 141B. The hook portion 141B of the shown connecting means 140 is formed by bending a rod steel constituting the engaging portion 141, the connecting portion 144, and the exposure portion 145. However, it is necessary to insert the hook portion 141B of the connecting means 140 into the lower main iron-bar 11B before or during the lattice iron-bar 13 is engaged with the main iron-bars 11A, 11B of the framework 10 due to the hook portion 141B, and it is almost impossible to engage the connecting means 140 with the framework after fabricating the framework.

The connecting means 340, 440 shown in [A], [B] of FIG. 5d is almost the same as the connecting means 40 shown in FIG. 5a, however, it is differed in that while an artificial straight line formed between the connecting portion and the exposure portion, and an artificial straight line formed between the centers of the two main iron-bars of the framework is conformed, only the bending type of the lower hook portion is differed.

Further, the connecting means 240 shown in FIG. 5c is constructed by transforming the disk-shaped supporting member 43 having a dome portion of the connecting means 40 shown in FIG. 5a, and a supporting member 243 is comprised of a concrete member 243A having a cone shape, and a washer 243a made of a synthetic resin material or a metallic material arranged above the concrete member so as to prevent the damage of the concrete. Also, a bushing B (it is briefly denoted by nut bushing in the specification) including a nut member is mounted at the center of the cone-shaped member 243A.

In particular, a bolt portion 244a of connecting portion 244 and a bolt portion 245a of the exposure portion 245 engaging with the nut bushing B are connected to each other, and a notch portion N is formed at a mid portion between thereof, so that the exposure portion 245 can be easily removed by rotating the extension portion 245A of the exposure portion 245 with gripping it by means of the wrench, and the like, when the exposure portion 245 is to be separated from the nut bushing B at the time of removing the mold following the curing of the concrete, because the exposure portion can be cut by starting from the notch portion N of the mid portion between the respective bolt portions 244a, 245a of connecting portion 244 and the exposure portion 245.

Such bushing B and notch portion N can be introduced to the connecting means shown in FIGs. 5a, 5b or 5d.

Meanwhile, the respective engaging or hook portion of the connecting means shown in FIGs. 5a through 5d should be formed with holes having a diameter corresponding to the diameter of the main iron-bar so that it can surely engage with the main iron-bar.

In the complex connecting means having an interval maintaining function explained in FIGs. 5a through 5d, the inter-action between the supporting member 43, 143, 243 contacting with the upper portion of the panel 20 and the engaging portion 41B, 241B or hook portion 141B engaging with the lower main iron-bar 11B acts as the interval maintaining means.

Next, the connecting means 540, 640 shown in FIGs.6a and 6b are of the same type, and they have cross-sections of ㄱㄱ hape made by bending the metal plate and also act as an interval maintaining means.

As shown in FIGs.3a and 3b, the connecting means 540 shown in FIG. 6a is engaged by welding with the lower surface of the lower iron-bar 11B of the framework 110 via the upper plate 541, and the supporting portion 543 contacts with the upper surface of the mold panel 20 to separate the lower main iron-bar 11B of the framework 10 from the panel 20 by such interval identical with the height thereof.

Also, the engaging portion 541 of the connecting means 540 is provided with the nut bushing B having a height corresponding to that of the supporting member 543 at the lower surface, the nut bushing being screw-engaged with the exposure portion 545 with the extension portion 545A. The exposure portion 545 and the extension portion 545A thereof function as described in connection with FIG.5a.

The nut bushing B is acted to remove the exposure portion 545 at the time of dismantling the mold following the curing of the concrete of the framework system F as will be described in connection with FIG. 9 below, and the vacant space made by the bushing B can be used as engaging means of a hanger pole for several piping. Such use of the bushing can be applied identically to the connecting means 240 shown in FIG.5c.

Further, the connecting means 640 shown in FIG.6b is made by bending the metallic plate, and comprise an engaging portion 631 and a supporting portion 643. In addition, it is provided with a nut bushing B at the lower surface of the engaging portion 631. However, comparing with the connecting

means 540 shown in FIG. 6a, the engaging portion 641 of the connecting means 640 shown in FIG.6b is formed with contacting members 641a, 641b made by cutting and bending both ends thereof to enclose the lower main iron-bar 11B of the framework 10, resulting in the improvement of the convenience and safety of the welding work between the connecting means and the main iron-bar.

Such contacting member can be fabricated by weld-engaging a member having a cross-section of ⌐¬ shape with a member having a cross-section of ⌙ shape in a crossing shape.

In the connecting means described above in connection with FIGs. 5a through 6b, in order to fabricate the standardized framework and formalized truss framework system, the distance between the lattice iron-bars 13 of the framework 10 shown in FIG. 2a or the distance between the bent portions of the lattice iron-bars 113 of the framework 110 shown in FIG. 3a is positive number times the distance between the insert holes 21 of the mold panel 20. Also, the arranging interval of the connecting means in the framework system may be positive number times the distance between the lattice iron-bars or the distance between the bent portions of the lattice iron-bars.

Hereinafter, the construction method for the slabs using the truss framework system F of the present invention will be described below.

At first, the framework 10 comprising the main iron-bars 11A, 11B, which maintain the interval corresponding to the thickness of the slab constructed as shown in FIGs. 2a and 2b, and the lattice iron-bar 13 for maintaining the intervals between the main iron-bars and reinforcing them. As described before, the framework 10 can be a two dimensional shape or a three dimensional shape. The lattice iron-bar 13 can be constructed to cross the main iron-bars 11A, 11B in vertical, and the diameters of the respective iron-bar constituting the framework 10 can be identical or different. In this regard, it is desirable that the diameter of the lattice iron-bar 13 is smaller than that of the main iron-bar 11 in order to reduce the materials and facilitate the fabrication.

Further, as shown in FIGs.3a and 3b, the lattice iron-bar 13 is configured to bend in a zigzag shape, and the framework 110 can be fabricated by welding the lattice iron-bar to the main iron-bars 11A, 11B at the respective bent portion.

Also, the framework 10, 110 can be provided with several connecting means by

welding previously.
Further, the mold panel 20 made of the plywood board or the FRP plate and formed with a plurality of insert holes 21 with predetermined interval is prepared and transported to the construction field with the framework 10, 110. Especially, as shown in FIG. 4a, the mold panel 20 of the present invention constitutes the mold assembly M together with the securing device 30 and the panel connecting device 50, the fabrication of the mold assembly M has been executed in the factory or in the construction field, or assembly of it has been executed partially in the factory (for instance, preparing of the punctured panel and attachment of the securing device) and remaining portion of the fabrication work can be executed in the construction field (attachment of the connecting device).
Next, after arriving at the construction field, the truss framework system F can be fabricated by assembly of the mold panel 20, the framework 10, 110 and the connecting means 40 on the working table.
The working table has a size conforming to that of the slab itself of the house or one floor of a building or respective divided area formed by dividing the slabs into more than two, in the construction of a structure, especially, a building constructed in mass to form a complex of building having multiple floors and of the same structure. It is desirable to construct the truss framework system F corresponding to respective area such as a room or a living room, and the like of the building in consideration of the case of transporting the prefabricated truss framework system by means of a tower crane and the like, and the construction position of the girder or wall body supporting the truss framework system F.
In the fabrication of the framework system F, two types of engaging method can be existed, one of which is to arrange the framework 10, 110 above the mold panel 20, and the other is to engage the mold panel 20 above the connecting means 40 after arranging the connecting means 40 following the binding of the frameworks 10, 100 to each other. However, it is considered that the former method will be desirable in consideration of the following mounting process of the wall body and girder of the truss framework system F. Accordingly, it will be described on the basis of this method below, especially, with reference to FIGs. 2a and 2b.
At first, the mold panel 20 is positioned on the working table located above the ground by a height to be reached by the stretching of the worker, and

then the exposure portion 45, in which the connecting means 40 conforming to the insert holes 21 of the panel 20 is engaged with the nut bushing 41, can be positioned on the respective insert holes 21.

However, in case of the connecting means previously welded to the framework 10, the exposure portion 45 of the connecting means 40 becomes to be positioned at the insert hole 21 of the panel 20. Therefore, the interval between the insert holes 21 of the panel should conform to the interval of the connecting means engaged with the framework 10.

Further, the framework 10 arranged on the panel 20 can be engaged with a plurality of transverse reinforcing iron-bars 15 by means of conventional wire or welding, and if the truss framework system is to be lifted by means of a tower crane, a pipe for binding a wire of the tower crane with the truss framework system F can be fastened to the main iron-bar 11A of the framework 10.

Prior this process, the panels 20 can be connected to each other to form a mold conforming to a size of the truss framework system F. In this regard, the connection of the connecting device 50 has been described in connection with FIG. 4c.

Then, as shown in FIGs. 4a and 4d, the worker secures the insert hole 21 of the mold panel 21 to the exposure portion 45 passing through the insert hole 35 of the securing plate 30B in the securing device 50 and the extension portion 33a of the slit 33A in a wedge portion 33 of the sliding plate 30A by means of the wedge portion 33 of the sliding plate 30A.

FIG. 4d shows the extension portion 45A of the exposure portion 45 from the upper portion by rotating the original framework system to 180 degrees to confirm more definitely. The direction of the sliding plate 30A and the exposure portion 45 is set on the basis of the state shown in FIG. 4d.

When the worker strikes the ascending portion 31A of the sliding plate 30A by means of the hammer with pats, the recesses 31a, 31b of the sliding plate 30A moves slidably on the engaging portions 39a, 39b of the securing plate 30B, and the upper surface of the narrow portion 33b of the slit 33A in the wedge portion 33 is tightly engaged with the lower surface of the extension portion 45A of the exposure portion 45 to make the upper surface of the wedge portion 33 and the lower surface of the exposure portion 45 be close adhered to each other.

Accordingly, the truss framework system F of the present invention can

maintain the rigidity against substantial impact or load, because the lower surface of the extension portion 45A, the upper surface of the wedge portion 33 in the sliding plate 30A, the lower surface of the contacting portion 31, the securing plate 30B, the lower and upper surfaces of the mold panel 20 (confer FIG. 2a), the lower surface of the supporting member 43 of the connecting means 40 (confer to FIG. 2a), the lower hook portion 41B of the engaging portion 41 of the connecting means can be definitely close adhered to each other.

In the truss framework system F fabricated through such process, the framework 10 and the mold panels 20 are secured surely to each other by the connecting means 40 and the sliding plate 30A, and the panels 20 are secured to each other by the panel-connecting device 50.

Next, as shown in [A], [B] of FIG. 7, the fabricated truss framework system is transported above the constructed wall body by means of the tower crane, and the like, and is positioned on it securely.

In this instance, it is desirable that the truss framework system F is formed with an insert portion F1 for the wall body W at a position corresponding to that of the wall body.

Also, notice should be paid if a portion contacting with the end of the truss framework system F is a girder, differing from the wall body.

Concretely speaking, as the girder is thicker than the slab more than two times in general, it requires three or four days more than that of the slab to solidify the mortar or ready-mixed concrete after curing the concrete mortar or the ready-mixed concrete. Accordingly, it is in general that the supports, the yoke member, the long wire member, and the mold panel for the slab are at first dismantled prior to the dismantling of the mold and supports for the girder, and are used again in the following construction work of the building, especially in the construction of the upper floors of the same building.

In this instance, as shown in FIG. 8 (which is the same in shape of the framework system shown in FIGs. 3a and 3b), fillers 121A, 121B having narrower widths than those of the conventional panels are generally arranged at the contacting surfaces between the right and left panels 121A, 121B of the mold 120 for the girder G and the panel 20 for the slab so as to facilitate the separation of the mold panel for the conventional slab.

Therefore, in the present invention, it is desirable that a supporting table

127 is prepared above the fillers 121A, 121B and arranged to conform to the interval of the lower main iron-bar 11B of the framework 10, the supporting table having a height corresponding to that of the supporting portion 543 of the connecting means 540 of the truss framework system F of the present invention, so that respective end of the main iron-bar 11B can be supported by the supporting table 127 formed with an insert portion 127a for the main iron-bar 11B.

Further, the framework 110 used in the truss framework system positioned above the girder is provided with transverse reinforcing iron-bars 113A engaged vertically with the main iron-bars 11A, 11B at the end of the girder, so that it is possible to effectively cope with the load applied to the end, and an extension portion 11a, which is longer than the end of the upper main iron-bar 11A, is formed at the end of the girder in the main iron-bar 11B to assist in reinforcing the strength of the constructed structure.

At last, in the truss framework system F of the present invention, when the safe mounting and binding of the wall body W and the girder G have been completed, the ready-mixed concrete or the concrete mortar is supplied above the truss framework system, and curing of them is executed following the hardening and evening of them.

Conventionally, in general, a plurality of long wire members are arranged by predetermined interval at the lower of the mold panel of the slab to support the load of the ready-mixed concrete, and then, a plurality of yoke members vertically crossing with the long wire members are arranged in predetermined interval, and the yoke members are supported by using a plurality of supports having a adjustable height. Accordingly, in the floor of the building under curing, supports have been in general arranged densely to cause inconvenience for the worker to pass. When the slabs of the downstairs are dried after predetermined time, the supports and the yoke members, the long wire members, and the molds are dismantled and transported to upstairs, and curing process has been executed again.

It is possible to confirm the arrangement of the supports 126, yoke members 125 and the long wire members 124 at the lower panel 122 of the mold 120 for the girder G.

However, according to the construction method of the slab using the truss framework system F of the present invention, it is not necessary to prepare such long wire member, yoke member, and supports so as to support the slabs.

This is because the load of a building to be constructed can be supported by the trussed structure of the truss framework system and the wall body. Accordingly, the present invention can strikingly reduce the period of construction and construction costs.

Further, as shown in FIG. 9, the nut bushing B engaged at the lower of the engaging portion of the connecting means 540 after the curing of the concrete is buried in the concrete slab, and the exposure portion 45 engaged with the nut bushing B can be removed from the nut bushing 41 by means of the tool such as a wrench, and the like, as explained previously in connection with FIG. 5a at the time of dismantling the mold.

In this instance, it is possible to accomplish the convenience of the securing work of various ducts in the following construction process by mounting the hanger pole P for constructing the plaster boards for the ceiling or the ducts for the wiring, ventilation, and the water supply and sewerage system, and the like to the position of the nut bushing B formed by the removal of the exposure portion 45. The end of the hanger pole should be formed with a male-threaded portion P1 for the nut bushing B. It is possible to omit the highly difficult work of separately securing the hanger pole to the ceiling to thereby strikingly improve the construction of the building owing to this structure.

In this instance, it is necessary to maintain the arranging interval of the connecting means 40 in the truss framework system F of the present invention in order to suffice the restriction for assuring the interval of the hanger pole used for the ventilation ducts and the like, for instance, the restriction that the hanger poles should be mounted every 500 to 450 .

The use of the nut bushing for the hanger pole as described above can be applied to different type of connecting means in a same manner.

【Industrial Applicability】

As described above, according to the truss framework system of the present invention, construction capability can be improved by introducing connecting means for connecting the framework made in the factory and the mold panel, and for maintaining the predetermined interval between them. Especially, the process of fabricating the framework system can be strikingly reduced and the rigidity of the truss framework system can be improved by constructing the mold assembly using the panels with which the wedge-shaped securing device has been engaged.

Also, according to the construction method for the slabs of the present invention, a truss framework system is fabricated to conform to the size and shape of the respective divided area of the slabs, after dividing the slabs of one floor or a house into more than two pieces, in constructing slabs of structures, in particular, buildings which have multi-floors and are constructed in mass to form a complex, using an improved truss framework, and then the framework system for the slab is suspended above the constructed cross-beams or wall bodies by using a tower crane and the like, so that it is possible to accomplish the striking reduction of the construction period because it is not necessary to execute the iron-bar arranging work one by one or to mount the supports, and to reduce costs for labors and materials. Further, it is possible to prevent the safety accidents from being occurred in the works of removing the projected iron-bars following the iron-bar arranging work or curing of the slabs, and works of mounting the supports and dismantling of them. Also, it is possible to maintain the high quality of the structure in spite of the passing of time due to the truss structure between the framework and the wall body, and because the securely connected truss framework system has been used to increase the equality of the strength in the slabs, to minimize the wastes because the requiring materials are small, and to obtain the advantage of reducing the noise in mounting the framework for the slabs and dismantling of the mold.

While the present invention has been described with reference to the preferred embodiments, the present invention is not limited by the embodiments. It is to be understood that those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the present invention. However, such variations and modifications are all pertained to the scope of the present invention.